

## Unit 5 - Trigonometry

L1(7.1) Congruent & Similar Triangles**Definitions:**

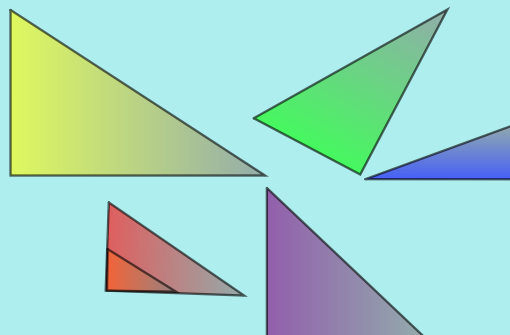
1. Ratio - a relationship between two quantities, usually expressed as a fraction.
2. Proportional - all ratios between corresponding sides are equal between two objects, and the ratio is called the scale factor.
3. Congruent - two objects are congruent if they have the same dimensions and shape (the scale factor is 1)

Proven if : SSS, SAS (angle contained) or ASA (side contained)

4. Similar - objects are proportional, but not congruent (the scale factor is not 1)

Proven if: SSS~, SAS~ or AA~

Which shapes are congruent? proportional?



## Parallel Line Theorems

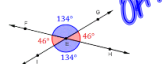
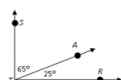
Z pattern	F pattern	C pattern
Alternate angles are equal	Corresponding angles are equal	Co-interior angles add to 180°

Remember....

SAT - **S**upplementary **A**ngle **T**heorem

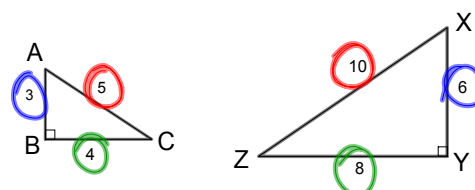
OAT - **O**pposite **A**ngle **T**heorem

CAT - **C**omplementary **A**ngle **T**heorem



Ex.1 Are the triangles congruent? Similar? Neither?

(a)



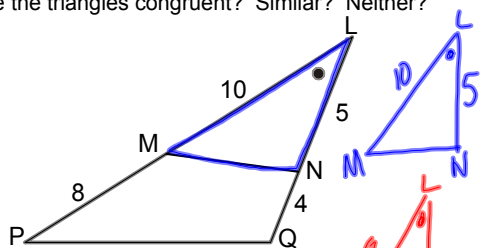
Congruent: proven if SSS or SAS or ASA

Similar: proven if SSS or SAS or AA~

∴ The Δ's are similar based on SSS  
 $\frac{10}{5} = \frac{6}{3} = \frac{8}{4}$   
 $2 = 2 = 2$

Scale factor of 2

(b) Are the triangles congruent? Similar? Neither?



Steps:

- 1) Split into two triangles
- 2) Prove similar or congruent

$$\frac{18}{10} = \frac{9}{5}$$

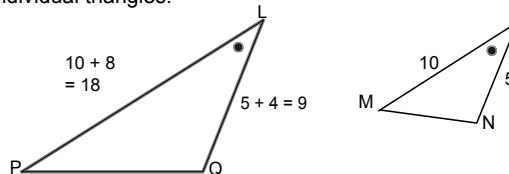
$$\frac{9}{5} = \frac{9}{5}$$

$$1.8 = 1.8$$

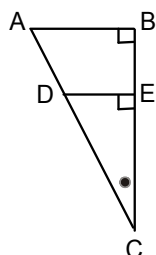
$$\angle MLN = \angle PLQ \text{ (given)}$$

$\therefore$  the  $\Delta$ 's are similar based on SAS

Recommend breaking overlapping triangles into individual triangles.



(c) Are the triangles ~~congruent?~~ Similar? Neither?



Steps:

- 1) Split into two triangles
- 2) Prove similar or congruent

$\angle B = \angle E (90^\circ)$   
 $\angle ACB = \angle DCE$  (given)  
 $\therefore \Delta$ 's are similar because of AA

Summary:

If  $\Delta ABC$  is similar to  $\Delta XYZ$ , we write:

$\Delta ABC \sim \Delta XYZ$

\* the order that we write the vertices is important

We can show similarity (or congruence) by:

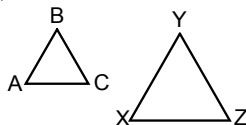
- (a) side-side-side similarity (SSS~)
- (b) side-angle-side similarity (SAS~)
- (c) angle-angle similarity (AA~)

order matters!

In similar triangles

- corresponding sides are proportional (i.e., the ratios are equal)
- corresponding angles are equal.

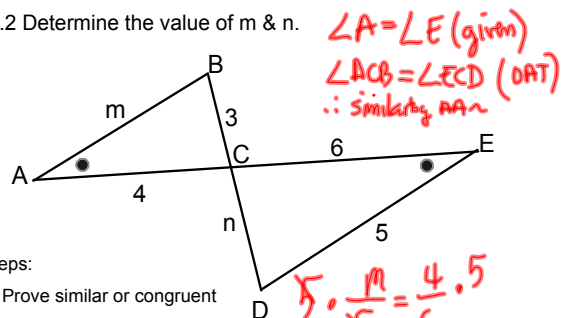
Given  $\triangle ABC \sim \triangle XYZ$



$$\text{Sides: } \frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$$

$$\text{Angles: } \begin{aligned} \angle A &= \angle X \\ \angle B &= \angle Y \\ \angle C &= \angle Z \end{aligned}$$

Ex.2 Determine the value of m & n.



Steps:

- 1) Prove similar or congruent
- 2) Solve for unknown

$$3 \cdot \frac{n}{3} = \frac{6}{4} \cdot 3$$

$$n = \frac{18}{4}$$

$$n = \frac{9}{2}$$

$$n = 4.5$$

$$5 \cdot \frac{m}{5} = \frac{4}{6} \cdot 5$$

$$m = \frac{20}{6}$$

$$m = \frac{10}{3}$$

$$m = 3.3$$

$\therefore$  side n is 4.5 units & m is 3.3 units

Assigned Work:

Read p.374 - 378

Answer p.378 # 1, 2, 4ac, 5, 6, 7ab, 8cd, 13